All India Test Series (2023-24)

Test Code: ANY/10

AITS TEST - 10

YAKEEN NEET

DURATION: 200 Minutes | **DATE: 23/04/2024** | **M. MARKS: 720**

Topics Covered

Physics:	Full Syllabus.
Chemistry:	Full Syllabus.
Botany:	Full Syllabus.
Zoology:	Full Syllabus.

General Instructions:

1. Immediately fill in the particulars on this page of the test booklet.
2. The test is of **3 hours 20 minutes** duration and the Test Booklet contains **200** multiple choice questions (four options with a single correct answer) from **Physics, Chemistry and Biology (Botany and Zoology)**. **50** questions in each subject are divided into **two sections (A and B)** as per details given below:
   (a) **Section A** shall consist of **35 (Thirty-five)** Questions in each subject (Question Nos. – 1 to 35, 51 to 85, 101 to 135 and 151 to 185). All Questions are compulsory.
   (b) **Section B** shall consist of **15 (Fifteen)** questions in each subject (Question Nos. – 36 to 50, 86 to 100, 136 to 150 and 186 to 200). In section B, a candidate needs to **attempt any 10 (Ten)** questions out of **15 (Fifteen)** in each subject.
   Candidates are advised to read all 15 questions in each subject of Section-B before they start attempting the question paper. In the event of a candidate attempting more than ten questions, **the first ten questions answered by the candidate shall be evaluated.**
3. There is only one correct response for each question.
4. Each **correct** answer will give **4 Mark** while **1 Mark** will be **deducted** for a **wrong** answer. The maximum marks are 720.
5. No student is allowed to carry any textual material, printed or written, bits of papers, pager, mobile phone, any electronic device, etc. inside the examination room/hall.
6. On completion of the test, the candidate must hand over the Answer Sheet to the Invigilator on duty in the Room/Hall. However, the candidates are allowed to take away this Test Booklet with them.

OMR Instructions:

1. Use blue/black dark ballpoint pen.
2. Darken the bubbles completely. Don't put a tick mark or a cross mark where it is specified that you fill the bubbles completely. Half-filled or over-filled bubbles will not be read by the software.
3. Never use pencils to mark your answers.
4. Never use whiteners to rectify filling errors as they may disrupt the scanning and evaluation process.
5. Writing on the OMR Sheet is permitted on the specified area only and even small marks other than the specified area may create problems during the evaluation.
6. Multiple markings will be treated as invalid responses.
7. **Do not fold or make any stray mark on the Answer Sheet (OMR).**

Name of the Student (In CAPITALS): _____

Roll Number: _____

OMR Bar Code Number: _____

Student's Signature: _____ Invigilator's Signature _____

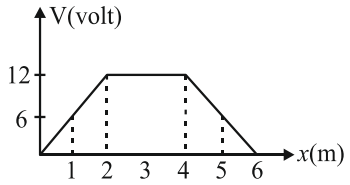
(PHYSICS)

SECTION-A

1. In ground to ground projectile motion, a body is projected with initial velocity of 20 m/s at an angle of 60° with vertical. The velocity of the body will make an angle of 45° with horizontal after time t is equal to:

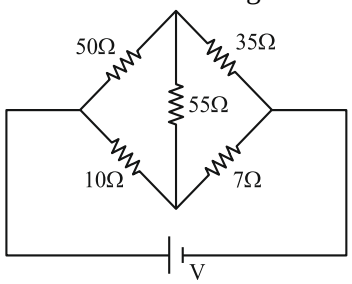
(1) 2 s
(2) 1.5 s
(3) 0.5 s
(4) velocity will never make an angle of 45° with horizontal

2. The variation of electric potential in a region with distance along x axis only from a fixed point is as shown below. A charge $+q$ is placed at x = 5 m and released. The charge will initially:



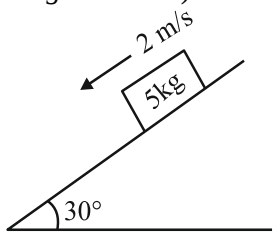
(1) Move away from origin
(2) Move towards the origin
(3) Not move
(4) Trace a circular path

3. A DC circuit is shown in figure. Power loss is zero across which of the following resistance?



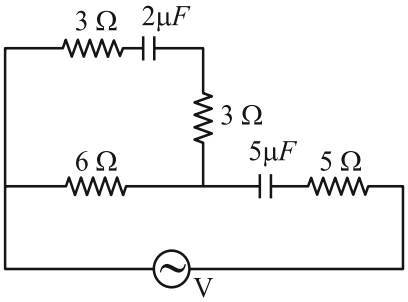
(1) 7 Ω (2) 10 Ω
(3) 50 Ω (4) 55 Ω

4. A block of mass 5 kg is moving downwards with a constant velocity of 2 m/s on a fixed inclined plane as shown in figure. The net force acting on block will be, (Take g = 10 m/s^2)



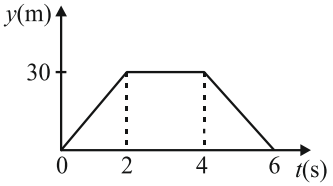
(1) 50 cos 30° N (2) 50 sin 30° N
(3) 50 N (4) Zero

5. An AC circuit is shown in figure. If very high frequency input voltage source is used, the effective impedance of the circuit is;



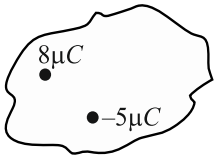
(1) 3 Ω (2) 8 Ω
(3) zero (4) infinite

6. The position (y) of a particle moving along y-axis varies with time (t) as shown in the figure. The average acceleration of particle in time interval t = 0 to t = 3 s is;



(1) 5 m/s^2 (2) –4 m/s^2
(3) 2.5 m/s^2 (4) –5 m/s^2

7. In a particular system, if number of electric field lines associated with 1C charge is 10^{10}, then the net number of electric field lines passing through the given closed surface is;



(1) 50000 (2) 30000
(3) 80000 (4) 0

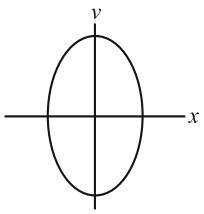
8. Two tuning forks of frequencies 512 Hz and 526 Hz respectively are vibrated simultaneously, then

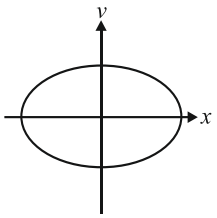
(1) Beat frequency heard by a person will be 14 Hz
(2) Beat frequency heard by a person will be 10 Hz
(3) Beats will not be produced
(4) Beats will not be heard by a person

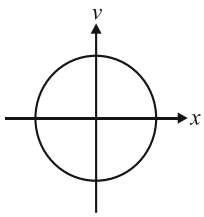
9. The total energy of an electron in a hydrogen like atom (or ion) in its ground state is –217.6 eV, it may be:

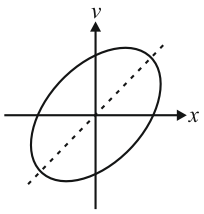
(1) B^{+4}
(2) He^{+}
(3) Li^{+2}
(4) Be^{+3}

10. A particle is executing SHM along *x*-axis about its mean position. The angular frequency of oscillation is 1 rad/s. The variation of velocity *v* of particle with displacement *x* from mean position is best represented as;

(1) 

(2) 

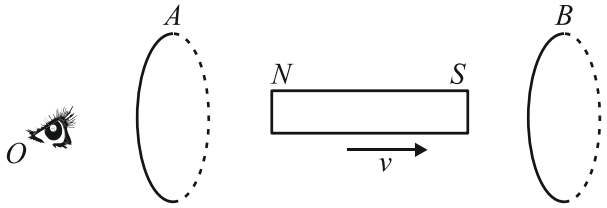
(3) 

(4) 

11. Two particles *A* and *B* initially at rest, move towards each other under mutual force of attraction. At an instance when the speed of *A* is 2*V* and speed of *B* is 5*V*, the speed of centre of mass of system of two particle is;

(1) 3*V*
(2) zero
(3) 7*V*
(4) 4*V*

12. A magnet is placed coaxially between two circular conducting loops as shown. As the magnet is moved towards right, the current induced in loops as observed by observer *O* is;

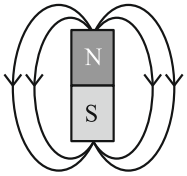


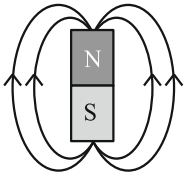
(1) Zero in both loops
(2) In same direction in both loops
(3) In opposite direction in both loops
(4) Zero in loop *A* and clockwise in loop *B*

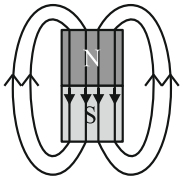
13. A body of mass *m* kg starts falling from a distance 2*R* above the earth's surface. What is its kinetic energy when it has reached to a distance '*R*' above the earth's surface? (*R* is the radius of Earth)

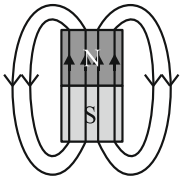
(1) $\frac{1}{4}mgR$
(2) $\frac{1}{3}mgR$
(3) $2mgR$
(4) $\frac{1}{6}mgR$

14. The magnetic field lines due to a bar magnet are correctly shown in:

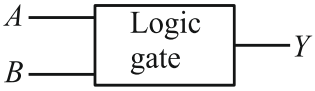
(1) 

(2) 

(3) 

(4) 

15. The following truth table corresponds to which logic gate?



A	0	0	1	1
B	0	1	0	1
Y	0	1	1	1

(1) NAND
(2) AND
(3) NOR
(4) None of these

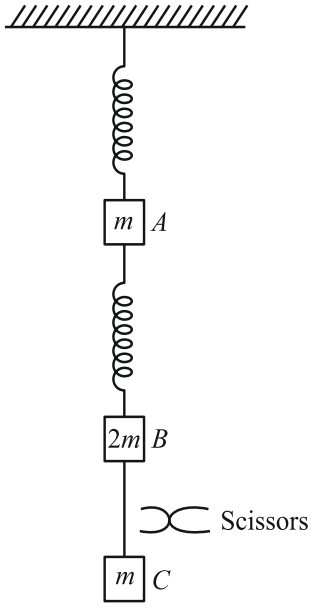
16. A container of depth 2*H* is filled with two immiscible transparent liquids of refractive index μ_1 and μ_2 respectively. The depth of each liquid is *H*. When viewed normally from above, the apparent depth of the vessel is;

(1) $\frac{H}{\mu_1}+\frac{H}{\mu_2}$
(2) $\frac{H}{\mu_1}-\frac{H}{\mu_2}$
(3) $\frac{2H}{\mu_1}+\frac{2H}{\mu_2}$
(4) $\frac{H}{2\mu_1}-\frac{H}{\mu_2}$

17. A body is rotating with uniform angular acceleration covers 200π radian in the first 8 s after it starts from rest. Its angular speed at the end of 8 s (in radian/min) is;

(1) 3000
(2) 3000π
(3) 50
(4) 50π

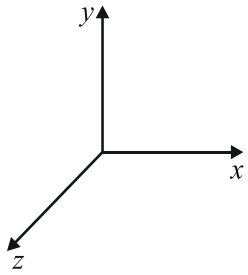
18. Three blocks *A*, *B* and *C* are connected by the help of two springs and a string as shown in figure. Initially system is at rest. What is the acceleration of block B immediately after the string is cut?



(1) $\frac{g}{2}$ upward (2) g upward

(3) $\frac{g}{2}$ downward (4) zero

19. Light waves is travelling along negative *y*-axis. If the corresponding magnetic field vector at any time is along positive *x*-axis, then the direction of electric field vector at that time will be along,



(1) +ve *x*-axis
(2) +ve *z*-axis
(3) –ve *y*-axis
(4) –ve *z*-axis

20. Consider the following two statements.

Statement I: Power of a biconvex lens remains unchanged when it is cut from anywhere along the principal axis.

Statement II: Power of a biconvex lens changes when it is cut perpendicular to the principal axis.

(1) Both Statement I and Statement II are correct.
(2) Both Statement I and Statement II is incorrect.
(3) Statement I is correct and Statement II is incorrect.
(4) Statement I is incorrect and Statement II is correct.

21. If $d = \frac{a^{\frac{3}{2}} b^{\frac{1}{4}}}{c}$ and percentage error in *a*, *b*, and *c* are 2%, 4% and 2% respectively, then maximum percentage error in *d* is;

(1) 6% (2) 5%
(3) 8% (4) 2%

22. In a conservative field, if the potential energy *U* as a function of position *x* is given as $U = x^3 + 2x + 3$, then the corresponding conservative force is given by:

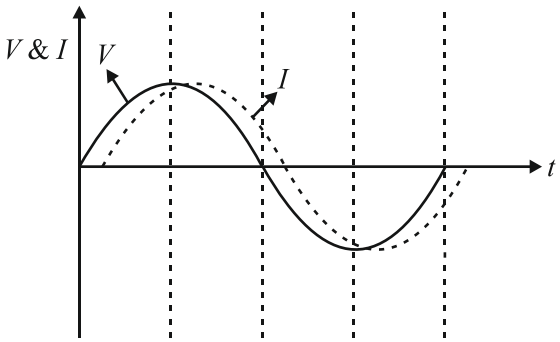
(1) $3x^2 + 2$
(2) $3x^2 - 2$
(3) $-3x^2 - 2$
(4) $4x^2 + 2$

23. A constant voltage at fixed temperature is applied across a conducting wire of constant length. How does the drift velocity V_d of electrons depends on the area of cross-section *A* of wire?

(1) $V_d \propto A$ (2) $V_d \propto A^\circ$

(3) $V_d \propto A^2$ (4) $V_d \propto A^{\frac{1}{2}}$

24. Graph shows voltage (*V*) and current (*I*) against time for an AC circuit where all elements will be in series. Circuit contain elements:



(1) C only (2) L only
(3) L, R only (4) R, C only

25. A faulty thermometer reads the melting point and boiling point of water as –1°C and 104°C respectively. The temperature of the object is measured as 40°C using that thermometer. The true temperature of the object is;

(1) 42°C (2) 39°C
(3) 81°C (4) 21°C

26. The number of photons emitted per second by a 62 W source of monochromatic light of wavelength 4800 Å is approximately:

(1) 1.5×10^{18} (2) 1.5×10^{20}
(3) 2.5×10^{20} (4) 4×10^{20}

27. Force constants of three ideal springs are in the ratio 3 : 2 : 1. They are stretched by the same lengths separately. If the potential energy stored in first spring is 10 J, then the potential energy stored in the third spring is;

(1) 30 J (2) $\frac{20}{3}$ J

(3) $\frac{10}{3}$ J (4) 15 J

28. A particle is moving three times as fast as an electron. The ratio of de-Broglie wavelength of the particle to that of electron is 1.81×10^{-4}. Calculate the particle's mass.

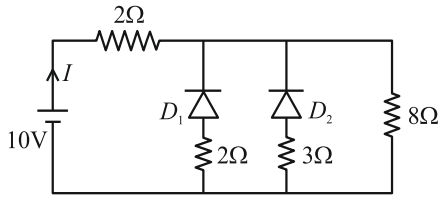
(1) 1.275×10^{-26} kg
(2) 1.576×10^{-27} kg
(3) 1.765×10^{-25} kg
(4) 1.675×10^{-27} kg

29. Sound wave of wavelength λ is travelling in a medium with speed v m/s enters into another medium where its speed becomes $\frac{v}{3}$ m/s. The wavelength of the sound wave in the second medium will be:

(1) $\frac{\lambda}{2}$ (2) $\frac{\lambda}{3}$

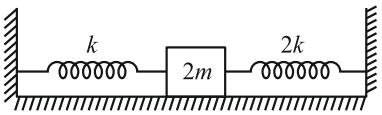
(3) λ (4) $\frac{3\lambda}{2}$

30. Value of current I in the circuit shown in figure is; (Assuming ideal diode)



(1) 1 A (2) 2 A
(3) 3 A (4) 4 A

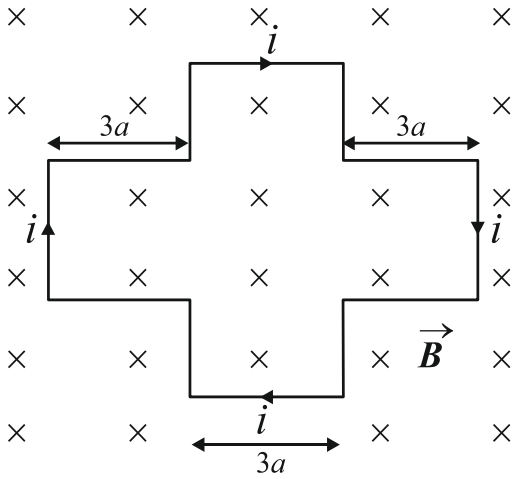
31. Two light springs of force constant k and $2k$ oscillate a block of mass $2m$ as shown in figure. The time period of oscillation of block is; (Assume frictionless surface)



(1) $2\pi\sqrt{\frac{3m}{2k}}$ (2) $2\pi\sqrt{\frac{m}{3k}}$

(3) $2\pi\sqrt{\frac{3m}{k}}$ (4) $2\pi\sqrt{\frac{2m}{3k}}$

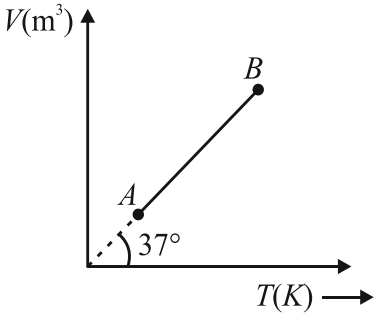
32. A current carrying loop is placed in uniform magnetic field B as shown in figure.



Magnitude of net magnetic force acting on it is;

(1) 0
(2) 3 aiB
(3) 9 aiB
(4) aiB

33. Volume vs Temperature curve for 3 moles of an ideal gas is a straight line as shown in figure. The pressure of gas at B is; (Take R = 8.3 J/mol-k)



(1) 12.4 Pa
(2) 33.2 Pa
(3) 8.9 Pa
(4) 18.6 Pa

34. Youngs double slit experiment is performed with monochromatic light of wavelength 550 nm. If the width of 2nd bright fringe is 5×10^{-2} cm, then the width of 6th dark fringe will be:

(1) 5×10^{-2} m
(2) 5×10^{-2} cm
(3) 2.5×10^{-2} cm
(4) 2.5×10^{-2} m

35. Water rises to a height of 9 cm in vertical capillary tube. If the same tube is titled at an angle 37° with the horizontal, then the length of water column in the tube will be:

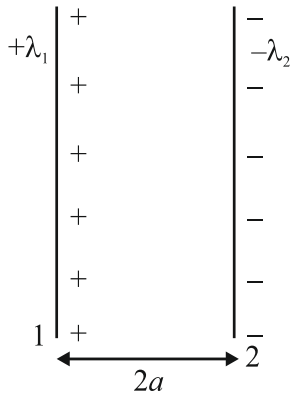
(1) 15 m (2) 10 m
(3) 9 cm (4) 0.15 m

SECTION-B

36. A river is flowing from west to east at a speed of 10 m/min. A man on north bank of river, capable of swimming at 20 m/min in still water wants to cross the river through the shortest path. In what direction should he swim?

(1) 30° West of north
(2) 30° North of west
(3) 30° West of south
(4) 30° South of west

37. Two parallel infinite line charges 1 and 2 with linear charge densities $+\lambda_1$ and $-\lambda_2$ respectively are placed at a distance of $2a$. $(|\lambda_1| > |\lambda_2|)$

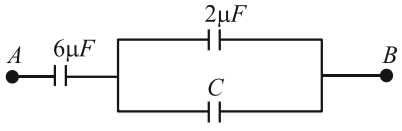


The perpendicular distance of a point from line charge 1 where the net electric field is zero is;

(1) $\frac{a\lambda_2}{\lambda_1-\lambda_2}$ (2) $\frac{2\lambda_1 a}{\lambda_1+\lambda_2}$

(3) $\frac{2\lambda_1 a}{\lambda_1-\lambda_2}$ (4) $\frac{a\lambda_2}{\lambda_1+\lambda_2}$

38. In the given circuit, the potential difference between A and B is 18V and charge on $2\mu F$ capacitor is $24\mu C$. The value of capacitance of unknown capacitor C is;

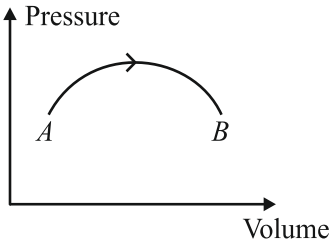


(1) $1\mu F$
(2) $2\mu F$
(3) $3\mu F$
(4) $4\mu F$

39. The length of an elastic string is x m when the tension is 10 N and y m when the tension is 12 N. The initial length of string (in meter) will be:

(1) $4x - 5y$
(2) $5y - 4x$
(3) $6x - 6y$
(4) $6x - 5y$

40. Consider the process $A \rightarrow B$ on a thermodynamic system as shown in figure below. During the process, the work done by the system;

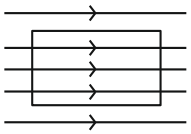
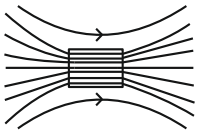
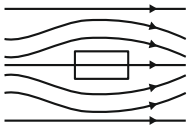
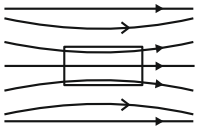


(1) Continuously increases
(2) Continuously decreases
(3) First increases then decreases
(4) First decreases then increases

41. The binding energy per nucleon for deuterium and helium nuclei are 1.1 MeV and 7.0 MeV respectively. When two deuterium nuclei fuse to form a helium nucleus, then the energy released in the fusion process is;

(1) 2.2 MeV
(2) 28.0 MeV
(3) 30.2 MeV
(4) 23.6 MeV

42. Most appropriate behaviour of magnetic field lines when paramagnetic substance is placed in uniform external field is represented in which of the following options?

(1) 
(2) 
(3) 
(4) 

43. **Assertion (A):** A YDSE experiment is performed using green light. If red light is used in place of green light, fringes become broader.
Reason (R): In YDSE, fringe width is directly proportional to wavelength of light used.

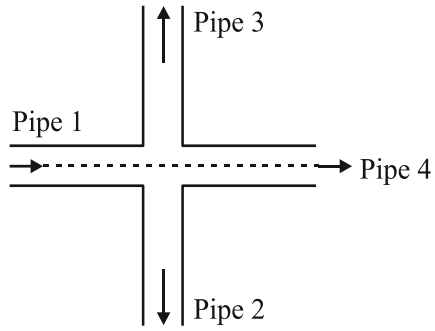
(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, but **Reason (R)** is false.
(4) Both **Assertion (A)** and **Reason (R)** is false.

44. A diatomic gas of molecular mass 40 g/mol is filled in a rigid container at temperature 30°C. It is moving with constant velocity of 200 m/s. If it is suddenly stopped, then the temperature of the gas is increased by: (neglect any heat loss to surrounding, R is universal gas constant)

(1) $\frac{32}{R}$ °C (2) $\frac{320}{R}$ °C

(3) $\frac{3200}{R}$ °C (4) $\frac{3.2}{R}$ °C

45. The amount of ideal liquid flowing per second in pipes (1), (2) and (3) are 25 m^3/s, 5 m^3/s and 10 m^3/s respectively. Velocity of liquid in pipe (4) having cross-sectional area 0.5 m^2 is; (All pipes are in same horizontal plane)

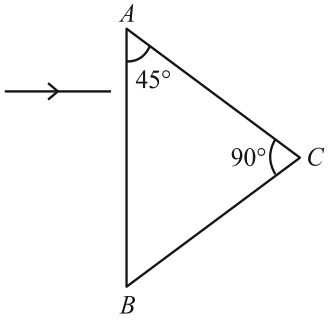


(1) 5 m/s
(2) 14 m/s
(3) 20 m/s
(4) 10 m/s

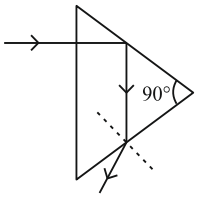
46. A conducting rod of 1 m length is rotating inside a uniform magnetic field of 6.28 mT with a frequency of 50 rev/s about its one end. The magnetic field is perpendicular to the plane of rotation. The value of induced emf between the ends of rod is;

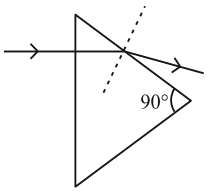
(1) 1 V
(2) 2 V
(3) 0.5 V
(4) 0.25 V

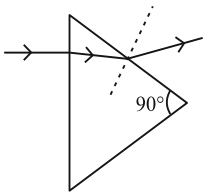
47. A ray of light is directed in front of a right angled prism *ABC*. The prism is made of crown glass with critical angle 41°.

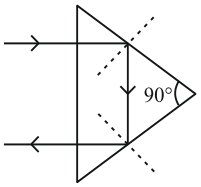


If a ray is incident perpendicular to face *AB*, then the **correct** path of ray will be:

(1) 

(2) 

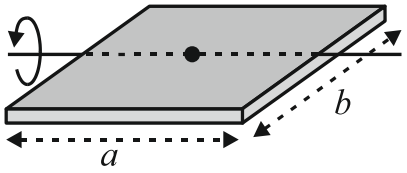
(3) 

(4) 

48. A charge q initially at rest is placed in a region of magnetic field $\vec{B} = 2\hat{i} + 3\hat{j} + 7\hat{k}$ T, then the charged particle will:

(1) be in uniform circular motion.
(2) be accelerated along straight line.
(3) be in non-uniform circular motion.
(4) remain at rest.

49. A thin uniform rectangular plate is rotating about an axis passing through its centre and perpendicular to side b as shown in figure.



If moment of inertia of the plate about this axis is MR^3, then value of R is (M = mass of plate)

(1) $\frac{a^{\frac{2}{3}}}{(12)^{\frac{1}{3}}}$ (2) $\frac{b^{\frac{2}{3}}}{(12)^{\frac{1}{3}}}$

(3) $\frac{b^2}{(12)^{\frac{1}{3}}}$ (4) $\frac{ab}{12}$

50. A space shuttle is launched in a circular orbit which is very close to the earth's surface. The minimum additional velocity to be given to the space shuttle to get free from the influence of earth's gravitational force will be approximately.

(1) 1.52 km/s
(2) 2.75 km/s
(3) 3.20 km/s
(4) 5.18 km/s

(CHEMISTRY)

SECTION-A

51. What is the empirical formula of vanadium oxide, if 8.0 g of the metal oxide contains 6.08 g of metal? (Molecular weight of V = 52 g/mol)

(1) V_2O_5 (2) VO

(3) V_2O_7 (4) V_2O_3

52. Which one of the following has the maximum wavelength of absorption in the visible region?

(1) $[Co(NH_3)_6]^{3+}$ (2) $[Co(SCN)_6]^{3-}$

(3) $[Co(C_2O_4)_3]^{3-}$ (4) $[CoCl_6]^{3-}$

53. A solution containing 30 g/dm^3 of urea (molecular mass = 60 g/mol) is isotonic with a 20% solution of a non-volatile solute. The molecular mass of this non-volatile solute is;

(1) 0.4 g mol^{-1} (2) 40 g mol^{-1}

(3) 2 g mol^{-1} (4) 20 g mol^{-1}

54. Identify the major product P and Q in the following reactions;

$$Q \xleftarrow{PCl_3} \text{Propanoic acid} \xrightarrow[(ii)\ H_2O]{(i)\ Cl_2/Red\ P} P$$

(1) P = $CH_3–CH_2–COCl$
Q = $CH_3–CH_2–COCl$

(2) P = $Cl–CH_2–CH_2–COOH$
Q = $CH_3–CH_2–Cl$

(3) P = $CH_3–CH_2–COCl$
Q = $CH_3–\underset{\displaystyle Cl}{\underset{|}{CH}}–COOH$

(4) P = $CH_3–\underset{\displaystyle Cl}{\underset{|}{CH}}–COOH$
Q = $CH_3–CH_2–COCl$

55. Which of the following statements is/are **incorrect**?

(I) Steam distillation is used for separation of 1 : 1 mixture of o-nitrophenol and p-nitrophenol.

(II) Thin layer chromatography is another type of adsorption chromatography.

(III) Kjeldahl's method is used for the estimation of sulphur.

(1) I and III (2) I and II

(3) II and III (4) III only

56. Which one of the following complexes have zero crystal field stabilization energy (CFSE)?

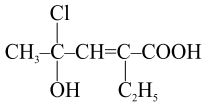
(1) $[Mn(H_2O)_6]^{2+}$

(2) $[Fe(CN)_6]^{4-}$

(3) $[Cr(H_2O)_6]^{3+}$

(4) $[Co(H_2O)_6]^{3+}$

57. The IUPAC name of the given compound is;



(1) 4-Chloro-4-hydroxy-2-ethylpent-2-en-1-oic acid

(2) 4-Chloro-2-ethyl-4-hydroxypent-2-en-1-oic acid

(3) 4-Chloro-2-hydroxy-2-ethylpent-2-en-1-oic acid

(4) 2-Ethyl-4-chloro-4-hydroxypent-3-en-1-oic acid

58. Which one of the following order is **correctly** matched with the property mentioned against it?

(1) Mg < Al < Si (First ionization enthalpy)

(2) Si < C < P (Electronegativity)

(3) Br < Cl < F (Negative electron gain enthalpy)

(4) $F^- < O^{2-} < N^{3-}$ (Ionic radius)

59. Cis-trans isomerism is observed in;

(1) But-1-ene

(2) Pent-2-ene

(3) 2-Methylprop-1-ene

(4) 2-Methylbut-2-ene

60. Select the **correct** statement among the following.

(I) Electrophile are only positively charged species and can form a bond by accepting a pair of electrons from a nucleophile.

(II) Acetamide is resistant to nucleophilic attack by hydroxyl ions.

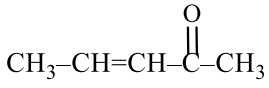
(III) In Riemer-Tiemann reaction, for the preparation of salicylaldehyde, the electrophile involved is dichlorocarbene.

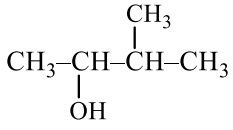
(IV) 3-Methylhexane exhibits chirality.

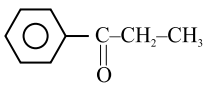
(1) I, III and IV (2) III and IV

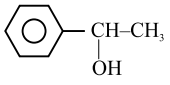
(3) III only (4) IV only

61. Which one of the following compound does **not** give yellow precipitate on heating with iodine in the presence of sodium hydroxide?

(1) 

(2) 

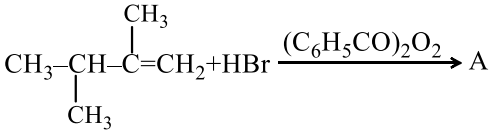
(3) 

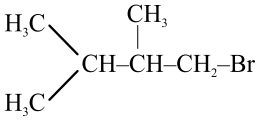
(4) 

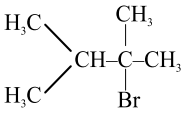
62. If 71 g of Na_2SO_4 is dissolved in 500 g of H_2O, the freezing point is changed by –3.72°C. The van't Hoff factor for Na_2SO_4 is;
(K_f for H_2O is 1.86 K kg mol^{-1})
(1) 3 (2) 2.5
(3) 1.8 (4) 2

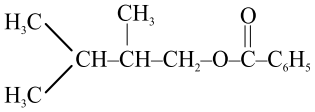
63. **Assertion (A):** Ca^{2+} has a smaller ionic radius than K^+.
Reason (R): Ca^{2+} has lower effective nuclear charge due to greater p/e ratio.
(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A).**
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A).**
(3) **Assertion (A)** is true, but **Reason (R)** is false.
(4) **Assertion (A)** is false, but **Reason (R)** is true.

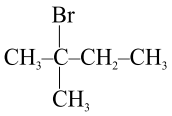
64. The major product 'A' of the following chemical reaction is;



(1) 

(2) 

(3) 

(4) 

65. What will be the number of electrons delivered at the cathode during the electrolysis by a 10 ampere of current in 193 seconds?
(1) 6.022×10^{21} (2) 1.20×10^{22}
(3) 6.022×10^{20} (4) 1.20×10^{21}

66. The alkane that gives only one mono-chloro derivative on chlorination with Cl_2 in presence of diffused sunlight is;
(1) n-Hexane
(2) n-Butane
(3) 2,2,3,3-Tetramethyl butane
(4) 2,2,3,3-Tetramethyl hexane

67. For a first order reaction; A → B, the rate of reaction at the reactant concentration of 0.02M is found to be 6.0×10^{-4} mol L^{-1} s^{-1}.The half-life period of the reaction is;
(1) 2.31 sec (2) 34.3 sec
(3) 69.3 sec (4) 23.1 sec

68. The oxidation state of Mn is maximum in;
(1) MnO_2 (2) $KMnO_4$
(3) K_2MnO_4 (4) MnO

69. **Correct** statement among the following is;
(1) ICl_4^- is tetrahedral in shape.
(2) NO_3^- and CO_3^{2-} are isoelectronic but not isostructural.
(3) O_2^- is diamagnetic.
(4) CN^- and NO^+ have same bond order.

70. If the ionization energy of hydrogen atom is 13.6 eV, then the ionization energy of He^+ is;
(1) +54.4 eV (2) –54.4 eV
(3) +122.4 eV (4) –122.4 eV

71. Which of the following statement is **incorrect**?
(1) Lactose is composed of β-D-galactose and β-D-glucose.
(2) During denaturation of protein, secondary and tertiary structures are destroyed but primary structure remains intact.
(3) RNA contains adenine, guanine, cytosine and thymine as bases.
(4) In DNA molecules, the sugar moiety is β-D-2-deoxyribose.

72. Bromobenzene reacts with magnesium in the presence of dry ether gives a product which on further reaction with methanol gives 'A' as a major product. Further 'A' reacts with n-propyl chloride in the presence of anhydrous $AlCl_3$ to give 'B'. The compound 'B' is;
(1) toluene
(2) iso-propyl benzene
(3) n-propyl benzene
(4) phenol

73. Which one of the following compounds reacts with benzene sulphonyl chloride to give a product which is insoluble in alkali?
(1) Ethylamine
(2) Dimethylamine
(3) Isopropyl amine
(4) N,N-Diethylbutylamine

74. What is the value of internal energy change at 25°C for the given reaction?
$FeCO_3(s) \rightarrow FeO(s) + CO_2(g)$; $\Delta H = 63.9$ kJ
(1) –63.90 kJ (2) +63.90 kJ
(3) +61.42 kJ (4) –61.42 kJ

75. Which one of the following contains maximum number of lone pairs on the central atom?

(1) XeO_3 (2) $SeCl_4$

(3) I_3^+ (4) XeF_2

76. For the reaction;

$A(g) + 2B(g) \rightleftharpoons 3C(g)$ at 27°C,

8 moles of A, 3 moles of B and 4 moles of C are present in 3 litre vessel. If K_c for the reaction is 0.80, the reaction will proceed in;

(1) backward direction
(2) forward direction
(3) neither direction
(4) cannot be predicted

77. What is the shortest wavelength line in the Brackett series of He^+ ion?

(1) $\frac{R}{4}$ (2) $\frac{2}{R}$

(3) $\frac{4}{R}$ (4) $\frac{R}{2}$

78. Match **List I** with **List II** and choose the **correct** option.

List I		**List II**	
(A)	Glycine	(I)	Sulphur containing amino acid
(B)	Serine	(II)	Optically inactive amino acid
(C)	Histidine	(III)	Alcohol containing amino acid
(D)	Cysteine	(IV)	Imidazole ring containing amino acid

(1) A-III, B-I, C-II, D-IV
(2) A-III, B-II, C-IV, D-I
(3) A-II, B-I, C-III, D-IV
(4) A-II, B-III, C-IV, D-I

79. **Assertion (A):** The stability of Cu^{2+} (aq) is more than Cu^+ (aq).

Reason (R): More negative $\Delta_{hyd}H°$ of Cu^{2+} than Cu^+ which more than compensates for the second ionization enthalpy of Cu.

(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A).**
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A).**
(3) **Assertion (A)** is true, but **Reason (R)** is false.
(4) **Assertion (A)** is false, but **Reason (R)** is true.

80. Consider the reaction,

$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$; $\Delta H = -93.6$ kJ mol^{-1}

the number of moles of N_2 at equilibrium will increase when;

(1) pressure is decreased
(2) temperature is decreased
(3) argon gas is added at constant volume
(4) NH_3 is removed

81. **Statement I:** PCl_5 in the solid state exists as an ionic solid.

Statement II: Orthophosphorous acid on heating disproportionate to give orthophosphoric acid and phosphinic acid.

(1) Statement I and Statement II both are correct.
(2) Statement I and Statement II both are incorrect.
(3) Statement I is correct, but Statement II is incorrect.
(4) Statement I is incorrect, but Statement II is correct.

82. Al_2O_3 is reduced by electrolysis at low potentials and high currents. If 2.0×10^5 A of current is passed through molten Al_2O_3 for 386 seconds, what mass of aluminium is produced?

(1) 3.6×10^3 g (2) 7.2×10^3 g

(3) 3.6×10^2 g (4) 7.2×10^2 g

83. The solubility of different sparingly soluble salts are given as under, then the **correct** increasing order of solubility is;

S. No.	**Formula Type**	**Solubility product**
I.	AB	1.6×10^{-19}
II.	A_2B	10.8×10^{-8}
III.	AB_3	2.7×10^{-15}

(1) III < II < I (2) I < II < III

(3) I < III < II (4) II < III < I

84. **Statement I:** BCl_3 easily accepts a lone pair of electrons from ammonia to form $BCl_3.NH_3$.

Statement II: The basic structural unit of silicates is SiO_4^{4-} in which silicon atom is bonded to four oxygen atoms in tetrahedron fashion.

(1) Statement I and Statement II both are correct.
(2) Statement I and Statement II both are incorrect.
(3) Statement I is correct, but Statement II is incorrect.
(4) Statement I is incorrect, but Statement II is correct.

85. Which of the following is **not** an intensive property?

(1) Viscosity (2) Pressure

(3) Density (4) Heat capacity

SECTION-B

86. What will be the percent yield of a given reaction, if 5 moles of $Fe(NO_3)_3$ and 6 moles of Na_2CO_3 is taken and 4 moles of $NaNO_3$ is obtained?

$2Fe(NO_3)_3 + 3Na_2CO_3 \rightarrow Fe_2(CO_3)_3 + 6NaNO_3$

(1) 33.3% (2) 40%
(3) 66.6% (4) 100%

87. The oxidation state of chromium and sulphur in the products obtain when SO_2 is passed into an acidified potassium dichromate solution respectively are;

(1) +3, +6 (2) +6, +3
(3) +6, +6 (4) +3, +3

88. A solution of ethanol and acetone;

(1) shows a positive deviation from Raoult's law
(2) shows a negative deviation from Raoult's law
(3) behaves as an ideal solution
(4) obeys Raoult's law

89. The conjugate acid of NH_2^- is;

(1) N_2H_4 (2) NH_4^+
(3) NH_2OH (4) NH_3

90. How many electrons in an atom can have the quantum number value, $n=3, l=2$ and $m=-2$?

(1) 3 (2) 4
(3) 1 (4) 2

91. **Statement I:** Carbon in diamond is sp^2 hybridised.
Statement II: In the presence of water, chlorine with sulphur dioxide forms sulphuric acid.

(1) Statement I and Statement II both are correct.
(2) Statement I and Statement II both are incorrect.
(3) Statement I is correct, but Statement II is incorrect.
(4) Statement I is incorrect, but Statement II is correct.

92. The work done when 1 mole of an ideal gas expands isothermally and reversibly from a pressure of 20 atm to 2 atm at 127°C will be;

(1) –76.5 kJ (2) –7.65 kJ
(3) +76.5 kJ (4) +7.65 kJ

93. When vapours of 3-Methylbutan-2-ol are passed over heated copper at 573 K, the product formed is;

(1) $CH_3-\underset{\displaystyle CH_3}{\overset{}{C}}=CH-CH_3$ (2) $CH_3-\underset{\displaystyle CH_3}{\overset{}{C}}-CH=CH_2$

(3) $CH_3-\underset{\displaystyle CH_3}{\overset{}{CH}}-\underset{\displaystyle O}{\overset{\displaystyle \|}{C}}-CH_3$ (4) $CH_3-\underset{\displaystyle CH_3}{\overset{}{CH}}-COOH$

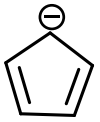
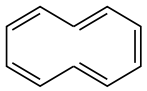
94. Which of the following is the **correct** order of basicity of amines in aqueous medium?

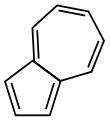
(1) $(C_2H_5)_2NH > (C_2H_5)_3N > NH_3 > C_2H_5NH_2$
(2) $(C_2H_5)_2NH > C_2H_5NH_2 > (C_2H_5)_3N > NH_3$
(3) $(C_2H_5)_2NH > (C_2H_5)_3N > C_2H_5NH_2 > NH_3$
(4) $(C_2H_5)_3N > (C_2H_5)_2NH > C_2H_5NH_2 > NH_3$

95. How many products will be obtained when ethanal and propanal reacts together in the presence of dil.NaOH/Δ?

(1) 3 (2) 4
(3) 2 (4) 1

96. Which of the following compound is **not** aromatic in nature?

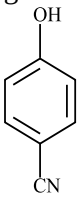
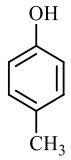
(1)  (2) 

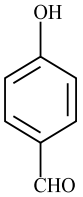
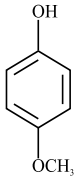
(3)  (4)

97. At 300 K, the rate constant of a chemical reaction is $0.4\times10^{-4}\ s^{-1}$ and at 350 K, the rate constant is $4\times10^{-4}\ s^{-1}$ then the value of activation energy is;

(1) 80.4 J mol^{-1} (2) 40.2 J mol^{-1}
(3) 80.4 kJ mol^{-1} (4) 40.2 kJ mol^{-1}

98. Which of the following substituted phenols is the strongest acid?

(1)  (2) 

(3)  (4) 

99. An alkene 'A' on reaction with O_3 and Zn-H_2O gives formaldehyde and Butan-2-one. Also, addition of HCl to alkene 'A' gives 'B' as the major product. The IUPAC name of product 'B' is;

(1) 1-Chloro-2-methylbutane
(2) 2-Chloro-2-methylbutane
(3) 2-Chloro-2-ethylpropane
(4) 1-Chloro-2-ethylpropane

100. Which of the following set of ions is coloured in aqueous solution?

(1) Ni^{2+}, Ti^{3+}, Sc^{3+}
(2) Mn^{2+}, Fe^{2+}, Cu^{+}
(3) Cu^{+}, Sc^{3+}, Ti^{3+}
(4) Mn^{2+}, Ti^{3+}, Fe^{2+}

(BOTANY)

SECTION-A

101. The three-domain system divides the Kingdom _____ into two domains, leaving the remaining eukaryotic kingdoms in the third domain.
(1) Monera (2) Protista
(3) Fungi (4) Animalia

102. Choose the **correct** statement.
(1) A typical angiosperm anther is bilobed with each lobe having four theca.
(2) The anther is a tetragonal structure consisting of four microsporangia.
(3) When the anther is young, sporogenous tissue occupies the corner of each microsporangium.
(4) The microsporangia develop further and become pollen grains.

103. Identify the **mismatched** pair.
(1) Diptera - Order
(2) Dicotyledonae - Class
(3) Sapindales - Family
(4) Angiospermae - Division

104. **Statement I:** Unlike bryophytes and pteridophytes, in gymnosperms the male and the female gametophytes do not have an independent free-living existence.
Statement II: The stems are unbranched in *Cycas* and branched in *Cedrus*.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct but Statement II is incorrect.
(3) Statement I is incorrect but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

105. Choose the **correct** statement w.r.t the incomplete dominance observed in snapdragon.
(1) The ratio between pink flowered plants and red flowered plants in F_2 generation is 1 : 2.
(2) All the progenies in F_2 generation resembled those in F_1 generation.
(3) Dominant character is observed in F_1 generation.
(4) The cross between F_1 generation plants with recessive parents will produce no red flowered plants.

106. All tissues on the inner side of the_____ constitute the stele.
(1) endodermis
(2) pericycle
(3) vascular bundles
(4) pith

107. Match **List-I** and **List-II** to find out the **correct** option.

List-I (Cell organelles)		**List-II (Characteristic)**	
(I)	Endoplasmic reticulum	(A)	Cisternae are concentrically arranged near the nucleus
(II)	Golgi apparatus	(B)	Inner membrane forms a cristae
(III)	Lysosomes	(C)	Continuous with the outer membrane of the nucleus
(IV)	Mitochondria	(D)	Membrane bound vesicular structures

	I	**II**	**III**	**IV**
(1)	C	B	A	D
(2)	C	D	A	B
(3)	D	A	C	B
(4)	C	A	D	B

108. The first action spectrum of photosynthesis was described by;
(1) Cornelius van niel.
(2) Jan Ingenhousz.
(3) Julius von sachs.
(4) T.W. Engelmann.

109. Identify the **mismatched** pair.
(1) F.W. Went - Isolation of auxin
(2) E. Kurosawa - Worked on fungal disease of rice seedlings
(3) F. Skoog - Crystallised cytokinesis promoting active substances
(4) H.H. Cousins - Confirmed the release of a volatile substance from ripened oranges

110. _____ noted the behaviour of chromosomes was parallel to the behaviour of genes and used chromosome movement to explain Mendel's laws.

(1) T.H. Morgan
(2) Watson and Crick
(3) Bateson and Punnett
(4) Sutton and Boveri

111. Match **List-I** and **List-II** and choose the **correct** option.

List-I		**List-II**	
(I)	Auxin	(A)	Hastens maturity period in juvenile conifers
(II)	Gibberellin	(B)	Hastens fruit ripening in tomatoes and apples
(III)	Cytokinin	(C)	Initiate rooting in stem cuttings
(IV)	Ethylene	(D)	Promote nutrient mobilisation

	I	**II**	**III**	**IV**
(1)	C	B	A	D
(2)	C	D	A	B
(3)	D	A	C	B
(4)	C	A	D	B

112. In the Citric acid cycle, during the conversion of _____ a molecule of GTP is synthesised.

(1) succinyl-CoA to succinic acid
(2) citric acid to α-ketoglutaric acid
(3) succinic acid to malic acid
(4) malic acid to oxaloacetic acid

113. Identify the **incorrect** statement.

(1) Artificial classification gave equal weightage to vegetative and sexual characteristics.
(2) Phylogenetic classification systems considered evolutionary relationships between the various organisms.
(3) In cytotaxonomy, each character is given equal importance.
(4) In chemotaxonomy, chemical constituents of the plant are used to resolve confusions.

114. **Statement I:** No enzyme that degrades sporopollenin is so far known.
Statement II: Pollen grain exine has prominent apertures called germ pores where sporopollenin is absent.

(1) Statement I and Statement II both are correct.
(2) Statement I is correct but Statement II is incorrect.
(3) Statement I is incorrect but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

115. Choose the **incorrect** statement w.r.t the sex determination in honey bees.

(1) Honey bees have a haplodiploid sex-determination system.
(2) An offspring formed from the union of a sperm and an egg develops as a female.
(3) The males have half the number of chromosomes than that of a female.
(4) Male bees have fathers but cannot have sons.

116. **Assertion (A):** Histones are organised to form a unit of eight molecules called histone octamer.
Reason (R): The negatively charged DNA is wrapped around the positively charged histone octamer to form a structure called nucleosome.

(1) Both **Assertion (A)** and **Reason (R)** are true and **Reason (R)** is a correct explanation of **Assertion (A).**
(2) Both **Assertion (A)** and **Reason (R)** are true but **Reason (R)** is not a correct explanation of **Assertion (A).**
(3) **Assertion (A)** is true but **Reason (R)** is false.
(4) **Assertion (A)** is false but **Reason (R)** is true.

117. _____ bacteria can fix atmospheric nitrogen while free-living in the soil thus enriching the nitrogen content of the soil.

(1) *Azospirillum* and *Glomus*
(2) *Azospirillum* and *Rhizobium*
(3) *Glomus* and *Rhizobium*
(4) *Azospirillum* and *Azotobacter*

118. Identify the **mismatched** pair.

(1) Predation - Sparrow eating any seed
(2) Competition - Visiting flamingoes and resident fishes in some shallow south American lakes
(3) Commensalism - Barnacle *Chathamalus* and barnacle *Balanus*
(4) Mutualism - Fungi and the roots of higher plants

119. Match **List-I** and **List-II** and choose the **correct** option w.r.t mitochondrial ETS.

List-I		List-II	
(I)	Complex I	(A)	Transfer of electrons to cytochrome *c* via cytochrome bc_1 complex
(II)	Complex II	(B)	Complex containing cytochromes *a* and a_3, and two copper centers
(III)	Complex III	(C)	Electrons from NADH are oxidised
(IV)	Complex IV	(D)	Oxidation of succinate to fumarate

	I	II	III	IV
(1)	C	B	A	D
(2)	C	D	A	B
(3)	D	A	C	B
(4)	C	A	D	B

120. Choose the **correct** statement.
(1) A flower is a modified leaf wherein the shoot apical meristem changes to floral meristem.
(2) Internodes get elongated and the axis gets condensed before flowering.
(3) The apex produces different kinds of floral appendages laterally at successive nodes instead of leaves for flowering.
(4) The flowers are borne in an acropetal order in cymose type of inflorescence.

121. Identify the **incorrect** statement.
(1) In dicotyledonous stems, cambium is present between phloem and xylem.
(2) Monocotyledonous stems form secondary tissues.
(3) In leaves, xylem and phloem are situated at the same radius.
(4) In stem, phloem is usually located only on the outer side of xylem.

122. **Statement I:** In stroma of the chloroplast, enzymatic reactions synthesise sugar, which in turn forms starch.
Statement II: There is a clear division of labor within the chloroplast.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct but Statement II is incorrect.
(3) Statement I is incorrect but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

123. In eukaryotes, RNA polymerase II transcribes;
(1) hnRNA. (2) tRNA.
(3) snRNA. (4) rRNA.

124. _____ of an ecosystem is the rate of production of organic matter during photosynthesis.
(1) Net primary productivity
(2) Gross primary productivity
(3) Secondary productivity
(4) Primary productivity

125. If '+' represents beneficial interaction, '–' represents detrimental interaction and '0' represents neutral interaction, then the population interaction amensalism will be indicated as;
(1) +, –
(2) +, +
(3) –, 0
(4) +, 0

126. **Assertion (A):** The zone, proximal to region of elongation in root, is called region of maturation.
Reason (R): The cells of the elongation zone of root gradually differentiate and mature.
(1) Both **Assertion (A)** and **Reason (R)** are true and **Reason (R)** is a correct explanation of **Assertion (A).**
(2) Both **Assertion (A)** and **Reason (R)** are true but **Reason (R)** is not a correct explanation of **Assertion (A).**
(3) **Assertion (A)** is true but **Reason (R)** is false.
(4) **Assertion (A)** is false but **Reason (R)** is true.

127. Choose the **incorrect** statement w.r.t the stages of mitosis.
(1) During prophase, each centrosome radiates out microtubules called asters.
(2) The chromosomes are spread through the cytoplasm of the cell during metaphase.
(3) During anaphase, chromosomes move to the equator.
(4) Final stage of karyokinesis is telophase.

128. All of the following are *in situ* conservation strategies, **except**;
(1) biosphere reserves.
(2) national parks.
(3) sacred groves.
(4) wildlife safari.

129. Choose the **incorrect** statement w.r.t the limitations of ecological pyramids.
(1) It does not take into account the same species belonging to two or more trophic levels.
(2) It accomodates a food web.
(3) Saprophytes are not given any place in ecological pyramids.
(4) It assumes a simple food chain, something that almost never exists in nature.

130. Identify the placentation based on given statements.
A. The ovules develop on the inner wall of the ovary or on the peripheral part.
B. Ovary is one-chambered, but it becomes two-chambered due to the formation of the false septum.
C. Classic examples are mustard and *Argemone*.
(1) Parietal (2) Axile
(3) Marginal (4) Free central

131. The position of centromere in a sub-metacentric chromosome is;
(1) at the center of chromosome.
(2) close to the one end of chromosome.
(3) at the terminal end.
(4) slightly away from the center.

132. **Assertion (A):** Mitosis or the equational division is usually restricted to the diploid cells only.
Reason (R): A very significant contribution of mitosis is cell repair.
(1) Both **Assertion (A)** and **Reason (R)** are true and **Reason (R)** is a correct explanation of **Assertion (A).**
(2) Both **Assertion (A)** and **Reason (R)** are true but **Reason (R)** is not a correct explanation of **Assertion (A).**
(3) **Assertion (A)** is true but **Reason (R)** is false.
(4) **Assertion (A)** is false but **Reason (R)** is true.

133. Identify the **incorrectly** matched pair.
(1) Initiator codon - AUG
(2) Stop codon - UGA
(3) Methionine - AUG
(4) Dual function codon - UUU

134. Choose the **incorrect** statement w.r.t the cyclic photophosphorylation.
(1) Only PS I is functional.
(2) A possible location is the stroma lamellae.
(3) Results in the synthesis of ATP and NADPH + H^+.
(4) Occurs when only light of wavelengths beyond 680 nm are available for excitation.

135. Consider the following statements and identify the **correct** stage of Meiosis I.
A. Four chromatids of each bivalent chromosomes becomes distinct.
B. Appearance of recombination nodules.
(1) Pachytene (2) Diplotene
(3) Zygotene (4) Diakinesis

SECTION-B

136. Identify the fungal class on the basis of following statements.
A. Sexual stage is absent.
B. Mycelium is septate and branched.
C. Majority of them are decomposers of litter and help in minerals cycling.
(1) Phycomycetes (2) Ascomycetes
(3) Basidiomycetes (4) Deuteromycetes

137. In mosses, protonema is;
(1) creeping, green, branched and frequently filamentous stage.
(2) develops as a lateral bud.
(3) upright with slender axes bearing spirally arranged leaves.
(4) attached to the soil through multicellular and branched rhizoids.

138. Match **List-I** and **List-II** to choose the **correct** option.

List-I (Type of aestivation)		**List-II (Examples)**	
(I)	Valvate	(A)	*Cassia*
(II)	Twisted	(B)	Bean
(III)	Imbricate	(C)	*Calotropis*
(IV)	Vexillary	(D)	Cotton

	I	**II**	**III**	**IV**
(1)	C	B	A	D
(2)	C	D	A	B
(3)	D	A	C	B
(4)	C	A	D	B

139. Identify the **mismatched** pair.
(1) Dicot root - Presence of casparian strips
(2) Monocot root - Polyarch xylem bundles
(3) Dicot stem - Presence of starch sheath
(4) Monocot stem - Phloem parenchyma is present

140. The basal body of cilia is made up of;
(1) centromere. (2) centrioles.
(3) kinetochore. (4) axoneme.

141. In an organism, the number of chromosomes at G_1 phase is 12. What would be the number of chromosomes at G_2 phase in it?
(1) 24 (2) 12
(3) 36 (4) 6

142. **Assertion (A):** Carboxylation is the fixation of CO_2 into a stable organic intermediate.
Reason (R): Carboxylation is the most crucial step of the Calvin cycle where O_2 is utilised for the carboxylation of RuBP.
(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A).**
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A).**
(3) **Assertion (A)** is true, but **Reason (R)** is false.
(4) **Assertion (A)** is false, but **Reason (R)** is true.

143. Choose the **incorrect** statement w.r.t the ATP synthase of mitochondria.
(1) The F_1 headpiece is a peripheral membrane protein complex.
(2) F_0 forms the channel through which protons cross the inner membrane.
(3) The protons are coupled to the catalytic site of F_1 for the production of ATP.
(4) For each ATP produced, $8H^+$ passes through F_1.

144. **Statement I:** The ability of plants to follow different pathways in response to environment or phases of life to form different kinds of structures is called plasticity.
Statement II: Coriander shows heterophyllous development due to environment.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct but Statement II is incorrect.
(3) Statement I is incorrect but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

145. The cylindrical portion below the level of cotyledons in a typical dicotyledonous embryo is;
(1) hypocotyl. (2) epicotyl.
(3) plumule. (4) radicle.

146. **Assertion (A):** Thalassemia is an autosome-linked recessive blood disease.
Reason (R): Thalassemia is a qualitative problem of synthesising an incorrectly functioning globin.
(1) Both **Assertion (A)** and **Reason (R)** are true and **Reason (R)** is a correct explanation of **Assertion (A).**
(2) Both **Assertion (A)** and **Reason (R)** are true but **Reason (R)** is not a correct explanation of **Assertion (A).**
(3) **Assertion (A)** is true but **Reason (R)** is false.
(4) **Assertion (A)** is false but **Reason (R)** is true.

147. Choose the **incorrect** statement w.r.t the adapter molecule.
(1) Francis crick postulated the presence of an adapter molecule.
(2) There are no tRNAs for stop codons.
(3) tRNA has an amino acid acceptor end to which it binds to amino acids.
(4) tRNAs are specific for each DNA strand.

148. Match **List-I** and **List-II** and choose the **correct** option.

List-I (Microbes)		**List-II (Usage)**	
(I)	Yeast	(A)	Bottled juices are clarified
(II)	Lipases	(B)	Removing clots from the blood vessels of patients
(III)	Pectinases	(C)	Commercial production of ethanol
(IV)	Streptokinase	(D)	Used in detergent formulations

	I	**II**	**III**	**IV**
(1)	C	B	A	D
(2)	C	D	A	B
(3)	D	A	C	B
(4)	C	A	D	B

149. Identify the given statements as true or false and choose the **correct** option.
A. MacArthur showed that five closely related species of warblers living on the same tree were able to co-exist due to behavioural differences in their foraging activities.
B. Gause's 'Competitive Exclusion Principle' states that two closely related species competing for the same resources cannot co-exist indefinitely.
C. In competitive exclusion when resources are limited the competitively superior species will eventually eliminate the other species.

	A	**B**	**C**
(1)	T	F	T
(2)	T	T	T
(3)	F	F	T
(4)	T	T	F

150. **Statement I:** When a species becomes extinct, the plant and animal species associated with it in an obligatory way also become extinct.
Statement II: When a host fish species becomes extinct, its unique assemblage of parasites also meets the same fate.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct but Statement II is incorrect.
(3) Statement I is incorrect but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

(ZOOLOGY)

SECTION-A

151. Choose the **incorrect** statement.
(1) Patella bone is not a part of appendicular skeleton.
(2) Knee joint and elbow joint are examples of hinge joint.
(3) The skull is composed of two set of bones- cranial and facial bones.
(4) The vertebral column serves as the point of attachment for the ribs.

152. During ultrafiltration, the blood is filtered in human kidney through the given layers, **except**;
(1) Endothelium of glomerular blood vessels.
(2) Basement membrane between endothelium of glomerular blood vessels and epithelium of Bowman's capsule.
(3) Cuboidal epithelium of PCT.
(4) Squamous epithelium of Bowman's capsule.

153. Select the **correct** match w.r.t. ABO blood grouping in humans.
(1) Blood group 'A' - Antigen 'A' on RBCs
(2) Blood group 'O' - Anti-A and anti-B antibodies on RBCs
(3) Blood group 'AB' - Donor's group can only AB and B
(4) Blood group 'B' - Donor's group can only B

154. To create awareness among the people about reproduction related aspects, following steps should be taken in consideration, **except**;
(1) Introduction of sex education in schools should be encouraged.
(2) Children should be encouraged in believing myths about sex related aspects.
(3) Proper information about adolescence and related changes should be given.
(4) Educating people about the care of pregnant mothers and post-natal care of the mother and child.

155. Raisen district of which state has rock shelters where you can find cave paintings by pre-historic humans?
(1) Maharashtra
(2) Andhra Pradesh
(3) Arunachal Pradesh
(4) Madhya Pradesh

156. 'X' acts on sertoli cells and stimulates the secretion of some factors which help in the process of spermiogenesis.
Select the option that **correctly** identifies '**X**'.
(1) LH (2) FSH
(3) TSH (4) GnRH

157. In which of the following animals, air sacs aid in respiration?
(1) *Neophron* (2) *Pristis*
(3) *Rana* (4) *Betta*

158. Choose the **incorrect** statement w.r.t. lipids.
(1) Arachidonic acid has 19 carbon atoms excluding the carboxyl carbon.
(2) Gingelly oil has higher melting point than fats.
(3) Lipids in neural tissues have complex structures.
(4) In many lipids, fatty acids are esterified with glycerol.

159. Select a palindromic nucleotide sequence.
(1) 5'-GATGCC-3'
3'-CTACGG-5'
(2) 5'-CTGCAG-3'
5'-GACGTC-3'
(3) 5'-GATAGC-3′
3'-CTATCG-5'
(4) 5'-CTGCAG-3'
3'-GACGTC-5'

160. Select the part of nephron which is lined by brush border cuboidal epithelium that increases the surface area for reabsorption.
(1) PCT (2) DCT
(3) CD (4) Loop of Henle

161. In *Plasmodium*, fertilization and further development takes place in which body part of host?
(1) Gut of human
(2) Gut of mosquito
(3) Salivary glands of mosquito
(4) Liver of human

162. The last part of oviduct has a **__X__** lumen and joins with **__Y__**. Select the **correct** option for '**X**' and '**Y**' respectively.
(1) narrow and uterus
(2) wide and ampulla
(3) narrow and ovary
(4) wide and ovary

163. Genetically modified plants are more tolerant to abiotic stresses which include all of the following **except**;
(1) Drought
(2) Fungal infection
(3) Cold
(4) Salinity

164. **Statement I**: Cytosine and uracil is present in DNA.
Statement II: GLUT-4, which enables glucose transport into cells, is a polysaccharide.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

165. Which among the following is a living fossil?
(1) Locust
(2) King crab
(3) Dog fish
(4) Hookworm

166. Select the **incorrect** match w.r.t. circulatory system in humans.
(1) Serum – Plasma without clotting factors
(2) Spleen – Graveyard of RBCs
(3) Eosinophils – Allergic reactions
(4) Chordae tendineae – Atria of heart

167. Choose the **incorrect** feature w.r.t. co-enzymes.
(1) Organic compounds
(2) Tightly bound to apoenzyme
(3) Play a crucial role in catalysis
(4) Essential chemical components in many co-enzymes are vitamins

168. Which scientist's work on population influenced Darwin?
(1) Lamarck
(2) Louis Pasteur
(3) Thomas Malthus
(4) S.L. Miller

169. All of the following statements are true for IUDs **except;**
(1) It is one of the least accepted methods of contraception in India.
(2) Progestasert is a hormone releasing IUD.
(3) IUDs are ideal contraceptive to delay pregnancies.
(4) IUDs increase phagocytosis of sperms within the uterus.

170. Select a common feature between *Crocodilus* and *Macaca*.
(1) Poikilothermy.
(2) Four-chambered heart.
(3) Notochord in adult stage.
(4) Presence of epidermal scales.

171. What term is used to describe the period when frogs take shelter in deep burrows to protect themselves from extreme heat?
(1) Aestivation
(2) Hibernation
(3) Dormancy
(4) Migration

172. Which of the following organs provides site for interaction of mature lymphocytes with the antigens.
(1) Bone marrow (2) Thymus
(3) Lymph nodes (4) Thyroid

173. Choose the enzyme which converts fibrinogen to fibrin during blood clotting?
(1) Thrombokinase
(2) Prothrombin
(3) Ca^{2+}
(4) Thrombin

174. How many of the given respiratory volumes/capacities are included in total lung capacity?

Residual volume, Tidal volume, Expiratory reserve volume, Inspiratory reserve volume

(1) 4 (2) 3
(3) 2 (4) 0

175. A gene locus has two alleles A and a. If the frequency of recessive allele a is 0.4, then what will be the frequency of homozygous dominant, heterozygous and homozygous recessive individuals in the population?
(1) 0.36 (AA), 0.48 (Aa), 0.16 (aa)
(2) 0.16 (AA), 0.24 (Aa), 0.36 (aa)
(3) 0.16(AA), 0.48(Aa), 0.36(aa)
(4) 0.16(AA), 0.36(Aa), 0.48(aa)

176. Consider the following.
A. Indirect method of gene transfer.
B. Suitable for plants.
C. Causes tumour.
The above features are applicable to;
(1) pBR322
(2) Biolistics
(3) Retrovirus
(4) Ti plasmid

177. Which of the following is **not** correct w.r.t. the functions of the thyroid hormones?
(1) Play important role in the regulation of the basal metabolic rate.
(2) Influence the maintenance of water and electrolyte balance.
(3) Play no role in the metabolism of proteins and fats.
(4) Support the process of red blood cell formation.

178. In male cockroaches, genital pouch lies at the hind end of abdomen bounded dorsally by;
(1) 9^{th} terga and 10^{th} sternum.
(2) 9^{th} sternum and 9^{th} terga.
(3) 9^{th} and 10^{th} terga.
(4) 9^{th} sternum and 10^{th} terga.

179. Select the **correct** match w.r.t. circulatory system in humans.
(1) Heart - Mesodermal in origin
(2) Pulmonary vein - Semilunar valve
(3) Pericardium - single walled membranous bag
(4) AV node - Pacemaker

180. Select the **odd** one among the following w.r.t events involved in the initiation of parturition.
(1) Increased concentration of estrogen.
(2) Release of oxytocin from maternal pituitary.
(3) Increased secretion of prolactin.
(4) Foetal ejection reflex.

181. In pBR322, selection of recombinants due to inactivation of antibiotics is a cumbersome procedure because;
(1) there is more than one recognition sites of commonly used restriction enzymes in antibiotic-resistance gene.
(2) it requires simultaneous plating on two plates having similar antibiotics.
(3) it requires simultaneous plating on two plates having different antibiotics.
(4) we are unable to differentiate transformants from non-transformants.

182. H-zone is present in;
(1) I-band only.
(2) both in A-band and I-band.
(3) light band.
(4) A-band only.

183. Which of the following secrete interferons as cytokine barriers?
(1) Virus-infected cells
(2) Non-infected cells
(3) Bacteria-infected cells
(4) Fungi-infected cells

184. Select the **Incorrect** option w.r.t. human zygote.
(1) Diploid in nature
(2) Absence of zona pellucida around it
(3) Single celled structure
(4) Carries either XX or XY sex chromosomes

185. _____ is the canal passing through the midbrain.
(1) Corpus callosum
(2) Cystic duct
(3) Cerebral aqueduct
(4) Cerebral quadrigemina

SECTION-B

186. **Assertion (A):** Hepatitis-B vaccine is produced from yeast.
Reason (R): Vaccines produced via recombinant DNA technology allow large scale production and hence greater availability for immunisation.
(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

187. **Assertion (A):** Food is captured by the bilobed tongue in frog.
Reason (R): Partially digested food called chyme is passed from stomach to the first part of the large intestine, the duodenum in frog.
(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

188. Match **List-I** with **List-II** and choose the **correct** option.

List-I		List-II	
(A)	*Culex*	(I)	Presence of proboscis gland
(B)	*Antedon*	(II)	Belongs to largest phylum
(C)	*Saccoglossus*	(III)	Marine spiny bodied animal
(D)	*Myxine*	(IV)	Devoid of paired fins

	A	B	C	D
(1)	II	III	I	IV
(2)	III	II	IV	I
(3)	IV	II	III	I
(4)	II	I	III	IV

189. How many of the given statements are **correct**?

A. The world population was around 2 billion in the year 1900.

B. Indian population was approximately 35 million at the time of our independence.

C. According to 2011 census report, population growth rate was more than 2 percent.

D. Rapid increase in MMR and IMR are probable reasons for huge increase in the population.

(1) Three (2) Four

(3) One (4) Two

190. **Assertion (A)**: A protein structure cannot exists throughout as extended rigid rod.

Reason (R): The structure which represents positional information of amino acids in a protein is called the primary structure.

(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.

(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.

(3) **Assertion (A)** is true, and **Reason (R)** is false.

(4) **Assertion (A)** is false, and **Reason (R)** is true.

191. Select the **incorrect** statement.

(1) Corpus luteum secretes large amount of progesterone which is essential for maintenance of the endometrium.

(2) Cyclic menstruation is an indication of normal reproductive phase.

(3) During menstrual phase, corpus luteum degenerates releasing progesterone in the blood.

(4) LH surge causes rupture of Graafian follicle.

192. **Assertion (A):** Melatonin influences menstrual cycle.

Reason (R): Melatonin does not play any role in the regulation of diurnal rhythm of our body.

(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.

(2) Both **Assertion (A)** and **Reason (R)** are the true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.

(3) **Assertion (A)** is true, and **Reason (R)** is false.

(4) **Assertion (A)** is false, and **Reason (R)** is true.

193. Cardiac muscles can be differentiated from skeletal muscles on the basis of presence of all of the following in their fibres, **except;**

(1) Branching

(2) Communication junctions

(3) Striations

(4) Number of nuclei

194. Birds are phylogenetically closer to __ **X** __ than __**Y** __.

Identify ' **X** ' and ' **Y** '.

	X	Y
(1)	*Pteropus*	Crocodiles
(2)	Mammals	Reptiles
(3)	Reptiles	Mammals
(4)	Snakes	Dinosaurs

195. Match **List-I** with **List-II** and choose the **correct** option.

List-I		List-II	
(A)	Chilled ethanol	(I)	Digests histones
(B)	Ethidium bromide	(II)	Digests RNA
(C)	Protease	(III)	Precipitation of purified DNA
(D)	Ribonuclease	(IV)	Visualisation of DNA fragments

	A	B	C	D
(1)	IV	III	I	II
(2)	III	IV	I	II
(3)	III	IV	II	I
(4)	I	II	III	IV

196. **Statement I:** Short exposure of dust from stone breaking industries can give rise to inflammation leading to fibrosis.

Statement II: Proliferation of fibrous tissue in lungs results in serious damage.

(1) Both statement I and statement II are correct.

(2) Both statement I and statement II are incorrect.

(3) Statement I is correct but statement II is incorrect.

(4) Statement I is incorrect but statement II is correct.

197. Consider the given reaction and select the **incorrect** option w.r.t. '**A**'.

$$CO_2 + H_2O \underset{}{\overset{(A)}{\rightleftharpoons}} H_2CO_3 \overset{(A)}{\rightleftharpoons} HCO_3^- + H^+$$

(1) By using 'A' about 600,000 molecules of carbonic acid are being formed every second.
(2) Plasma contains a very high concentration of 'A'.
(3) It helps in transportation of 70% of CO_2 in the form of bicarbonates in our body.
(4) It has accelerated the reaction rate by about 10 million times.

198. **Assertion (A):** A fall in GFR can activate the JG cells to release renin.
Reason (R): Rennin can stimulate the glomerular blood flow and thereby the GFR back to normal.
(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

199. The transgenic models exist for;
A. Rheumatoid arthritis
B. Alzheimer's disease
C. Cystic fibrosis
Select the **correct** option.
(1) A and B only
(2) B and C only
(3) A and C only
(4) A, B and C

200. Suppose the terminal ends of axon are in contact with dendrites of four adjacent neurons, the nerve impulse of the axon will;
(1) travel in all the four neurons.
(2) get distributed in all the four neurons resulting in a weak impulse.
(3) travel only in one neuron which is in closest contact and with the same intensity.
(4) travel in none of the neurons because the impulse travels from dendrites of one neuron into the axon of another neuron.

■■■

SPACE FOR ROUGH WORK

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